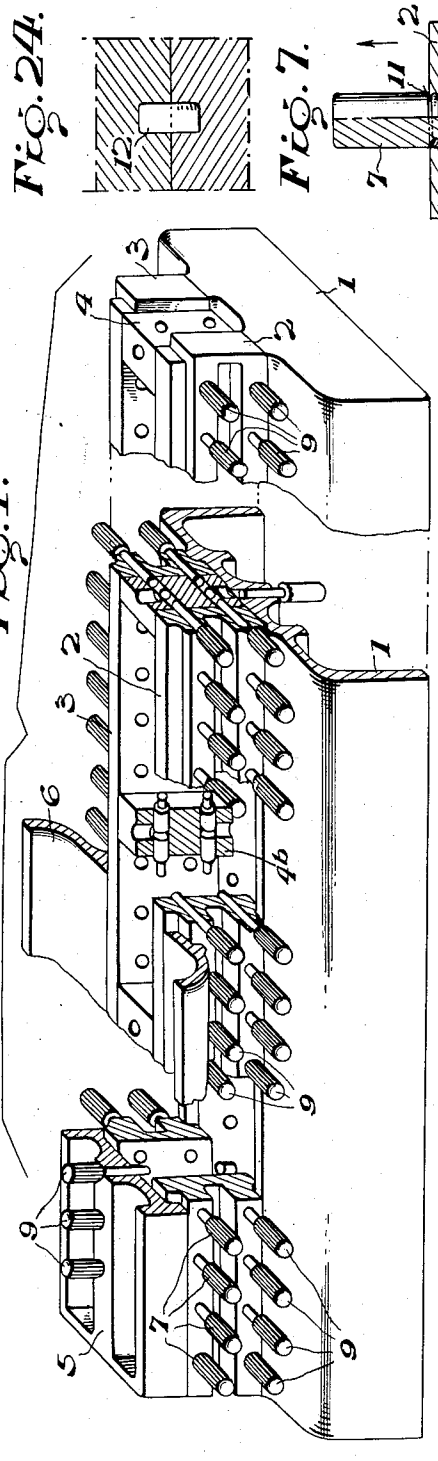
Feb. 16, 1954 J. BAECHLER 2,668,999

MEANS FOR MAKING TOY STRUCTURAL UNITS

Original Filed Dec. 15, 1949 2 Sheets-Sheet 1



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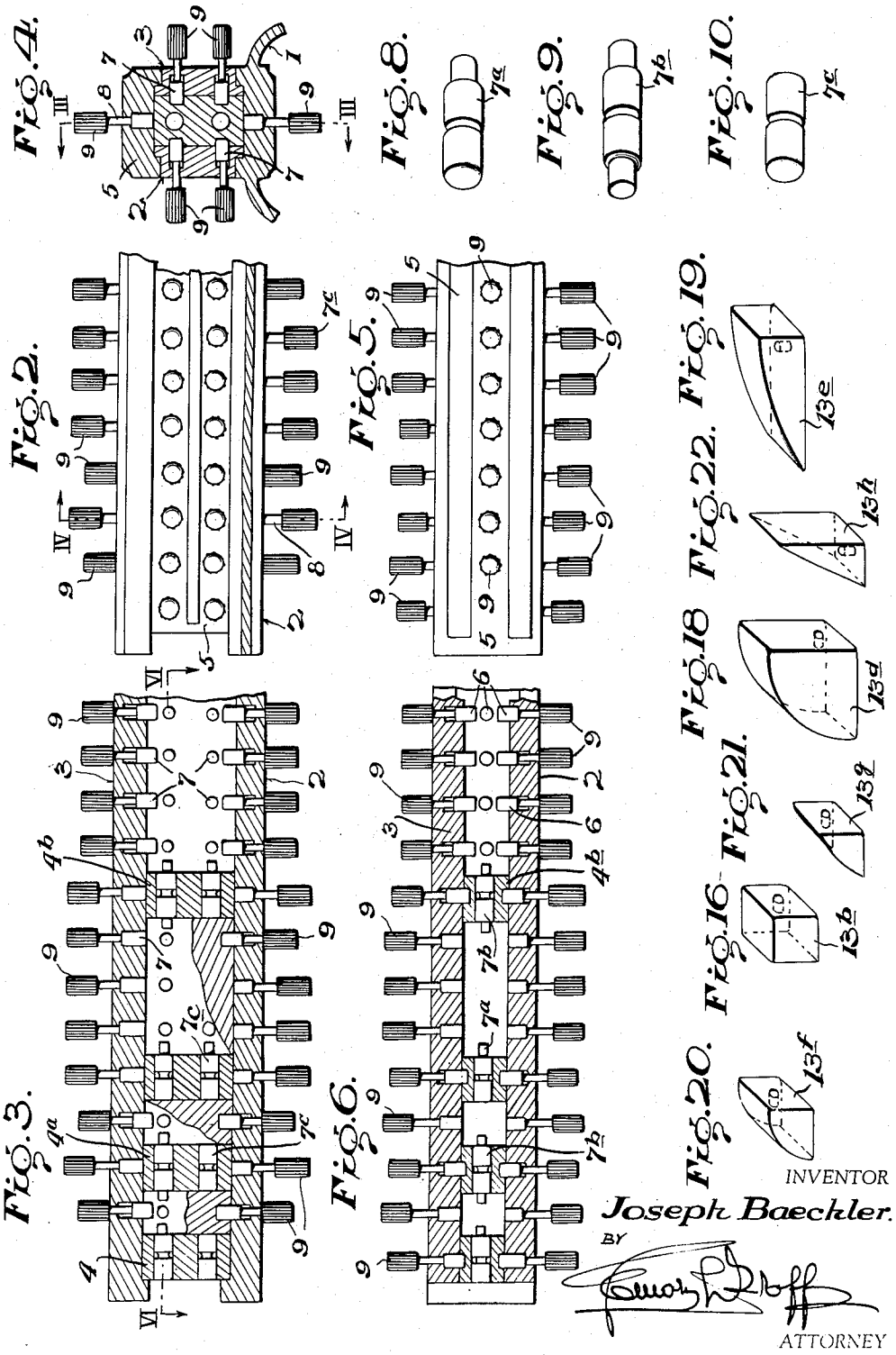

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MEANS FOR MAKING TOY STRUCTURAL UNITS

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7 Claims. (Cl. 25—121)

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The present invention is a division of my application Serial No. 133,023 filed December 15, 1949, and relates to an apparatus for moulding removable assembly construction elements of reduced scale, for the purpose of setting up models of various constructions, more particularly designed for construction games for children. The object is to manufacture, by means of the moulding apparatus according to the invention, elements of a quick setting material, which may easily be assembled and lending themselves to all sorts of modifications in order to produce constructional variations, by employing the recovered elements for new constructions.

The accompanying drawings, show, by way of example, various embodiments with accessory parts as well as some of the more usual construction elements which may be produced by means of this apparatus.

Figure 1 is a perspective view of the apparatus and including several cross sections, designed to simplify the understanding of the inner arrangement of the mould.

Figures 2 to 6 are fragmentary details of the apparatus of Figure 1 showing: in Figure 2, a fragment in longitudinal elevation: in Figure 3, a longitudinal section along the line III—III of Figure 4: in Figure 4, a cross section along the line IV—IV of Figure 2: in Figure 5, a plan view of Figure 2, and in Figure 6, a longitudinal section in plan along line VI—VI of Figure 3.

Figures 7 to 10, to a larger scale, show different forms of mandrels, designed to fill or stop the moulding holes in the elements to be manufactured.

Figures 11 to 13 show diagrammatically the method of distributing and arranging the different shapes of cores or partitions and mandrels in the mould, in order to produce various shapes of construction elements.

Figures 14 to 23 show a few of the more usual construction elements, produced by the moulding apparatus according to the invention.

Figure 24 shows, finally, the manner in which two adjacent elements may be joined together by means of a removable member.

The construction elements employed according to the present invention represent all shapes found in the building trade, and the moulding apparatus permits manufacturing all of the desired types of miniature structural elements 13 etc. To this end, a special apparatus has been conceived, an embodiment of which is shown by way of example in Figures 1 to 6.

On the other hand, the elements to be moulded

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are of reduced size and their sides are standardized, taking for example as basis the centimeter or a multiple of a centimeter. The elements are moulded from a hardening material such as cement, lime, gypsum or other quick-setting plastic material.

Since these elements must be suitable to be assembled in the dry state and taken to pieces without undergoing any deformation or damage, so as to serve for the setting up of a new construction, the usual methods and means of moulding cannot be employed directly, without making modifications therein, enabling one to manufacture them with a single mold and without other accessories than suitable mandrels.

An embodiment of a moulding apparatus, suitable to the requirements cited above, is given by way of example in Figures 1 to 6 of the accompanying drawing. Since the elements manufactured with this mould are of very reduced sizes, it has been necessary, for the construction of the mould, to resort to the use of metal or a plastic material, so that all the parts of the latter are for example, of aluminum, brass or synthetic material. Moreover, the length of the apparatus is calculated in such a way that it lends itself to the moulding of elements of varying lengths or, failing this, simultaneously of several elements by the same casting.

The mould shown comprises a base 1, including a foundation plate, which gives to the whole the required stability. On the plate are mounted the two vertical walls 2 and 3 having on their bottoms notches bearing on angle portions provided on the base plate, so as to ensure their parallelism, the distance chosen between the said walls being one centimeter. At their ends, the walls 2 and 3 are spaced by means of end walls 4 and intermediate partitions 4a, which will be described hereafter. The mould is covered with a lid 5, having a profile symmetrical with that of the portion of the foundation plate of the base 1. The lid straddles upper angle portions of the vertical walls, so that it prevents the dislodgement of the walls.

Since the lid or cover 5 is placed on the mould at the end of the moulding operation, use is first made of a removable feeder or hopper like member 6, in the shape of a funnel, facilitating the filling of the mould and avoiding dirt splashes.

The main characteristic of the mould described resides in the fact that it comprises primary mandrels 7, fitted to holes in the walls of the mould and serving to form in the elements to be manufactured, sockets which permit with the

aid of pins 12, later to be described, the instantaneous and exact assembly as well as their disassembling without any damage.

According to the variety of elements which may be manufactured with the mould described, it is necessary to provide for a whole series of mandrels 7, which can be adapted to the needs required. Figures 7 to 10 illustrate certain embodiments of mandrels.

The primary mandrels, Figure 7, comprise a piston-shaped cylindrical head member the length of which corresponds substantially to the thickness of the wall 2 of the mould. The said head is provided with a rod 8, the length of which is greater than the thickness of the wall of the mould, so that a handle 9, designed for the operation of the mandrel, may be fitted thereto. In its cylindrical head portion, the mandrel is provided with an annular groove 10, in which is housed an annular friction spring 11, adapted to releasably hold the mandrel in the wall of the mould and to prevent its accidental axial movement.

The mandrel described, housed in the wall of the mould, fulfills three different functions, viz: it serves to plug or stop the hole in the wall of the mould, to secure the core or separating partition 4*a* (Figure 1), and finally to form an assembly hole in the element to be moulded, which will serve to receive or house the connecting pin 12 for the purpose of joining two adjacent elements as shown in Figure 24.

It is obvious that a finished structural element 13 or the like sometimes requires two or more holes, either on the same face, or on adjacent faces, from which arises the necessity of several types of secondary socket forming mandrels, 7*a*, 7*b* and 7*c* as shown in Figures 8, 9 and 10 to be used, for example, on the partitions 4*a*.

Similarly, when the face of the element must be smooth, the mandrel is used to stop the hole, which is done by driving or forcing the mandrel 7 against the resistance of spring 11 through the thickness of the wall of the mould or else through the thickness of the separating partition.

The standard mandrel, shown in Figure 7 is arranged in one or two rows on the outer surfaces of the side walls of the mold at the specified places in order to be projected into the mold space when desired or projected into interlocking engagement with the end partitions 4*a* or into abutting holding engagement with intermediate partitions 4*b* when used as hereafter explained, or, as previously indicated, to form a hole in the finished structural element or block, such for example as 13*a*, or else merely to plug the hole in a side 1 or 2 so that the outer face of the head provides a smooth inner face for the mold space when desired.

When it is a question of manufacturing several different toy structural elements by means of the same casting operation, it is necessary to interpose several intermediate partitions 4*b* in the mold. In this case, the related mandrel 7 (Figure 7) is withdrawn until the face of the head thereof is flush with the wall 1 or 2 of the mold and the mandrel 7*a* of Figure 8 may then be used in the longer side walls of the intermediate partition 4*b* as shown in Figures 1–6 of the drawing. This forms one socket in the adjacent block element. However, in certain cases, if it is necessary to make sockets for pins 12 in adjacent block elements, that is one socket on each side, as where the partition 4*b* contributes to the manufacture of a block element located on each side of said partition, then the mandrel 7*b* is used according to Figure 9. The mandrel 7*c* according to Figure 10, without shoulders and no projecting mold part is used to seal the holes traversing the separating partition from end to end.

Figures 11, 12 and 13, as well as Figure 4, show by way of example several arrangements of mandrels and separating partitions inside the mould, in order to manufacture standard construction elements, outlined in Figures 14 to 23.

The arrangement according to Figure 11, permits of manufacturing normal elements, viz.: the cube 13 (Figure 14), the double cube 13*a* (Figure 15) and the parallelepiped 13*b* (Figure 16). The arrangement according to Figure 12 discloses the use of filler elements of varying geometrical shape 13*c*, 13*d*, 13*e*, 13*f* and 13*g* (Figures 17, 18, 19, 20 and 21) to produce finished blocks with arcuate surfaces. For elements 13*h* of triangular section (Figure 22) the mould is arranged as shown in cross hatching on the left hand side of Figure 3. Finally, for special elements 13*k* (Figure 23), use is made of the inside of the mould with the arrangement shown in Figure 13.

The advantages realized by the elements thus manufactured reside principally in the fact that their assembly and disassembling are of great simplicity, not requiring the use of any binder. A simple pin 12, placed in the moulding holes corresponding to two adjacent elements, suffices to produce a solid assembly and allows of the separation of the said elements when the assembly is to be taken apart.

These qualities are greatly appreciated in the construction of models of buildings, walls, arches, roofing or any other kind of construction. They permit of modifying or changing as a whole or in part the executed assemblies, thus rendering it possible to dismantle completely the executed construction and to make use again of the recovered elements for other similar purposes.

In another connection, the present invention offers an instructive and attractive interest for youth as a construction game, since it permits of combining and moulding oneself the elements designed for the construction of a piece of work conceived through his own imagination. It is therefore particularly suitable for use as school material.

I claim:

1. An educational and amusement apparatus for molding individual toy construction elements of selected geometrical shapes adapted to be readily assembled and disassembled to build and rebuild reduced scale models of various building designs according to the desire of the builder, comprising, in combination, a foundation plate a portion of which defines a mold bottom and having upstanding parallel shoulders at each side of the mold bottom, said bottom provided with openings, a pair of longitudinally disposed side walls having upper and lower shoulders, said lower shoulders engaging the said shoulders of the foundation plate, said side walls having at least one row of openings, end walls spacing said side walls and resting on the ends of the mold bottom, said end walls having at least one row of openings, a cover plate recessed on its under face fitting over the upper shoulders of the side walls and over said end walls, said cover plate provided with openings, primary mandrels frictionally slidable in the openings of the mold bottom, side walls, and cover, and having their outer ends provided with handle portions and their

inner ends provided with mold heads, said mandrels being selectively projectible in said openings to extend into the mold space formed by the mold bottom, side walls, and cover, and withdrawable to have their inner ends flush with the related mold surface, partition elements selectively spaced relative to each other and the end walls and between said side walls, said partition elements having openings, and secondary socket forming mandrels insertable and removable from said last mentioned openings.

2. An apparatus according to claim 1 having filler elements of different geometrical shapes supported by said foundation plate between said partition elements, whereby mating geometrical shaped finished construction elements are provided.

3. An apparatus according to claim 1, wherein the primary mandrels comprise a head and a shank extending through a related wall opening, and a handle on the end of the shank opposite the head.

4. An apparatus according to claim 1 wherein the primary mandrels comprise a head and a shank extending through a related wall opening, said shank having threads, and a handle having interior threads for engaging the threads on the shank.

5. An apparatus according to claim 1 wherein the primary mandrels comprise a head having an annular recess near its inner end, a spring ring in said recess for functionally egaging the sides of the opening in which the mandrel slides, and a manipulating handle at the exposed end of said opening.

6. An apparatus according to claim 1 wherein the secondary socket forming mandrels include a body having an annular recess to receive an annular friction spring.

7. An apparatus according to claim 1 wherein the secondary socket forming mandrels include a body having an annular recess to receive an annular friction spring and a reduced socket forming portion at one end of the body.

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